

NEW AND LITTLE KNOWN AUSTRALASIAN LAELAPTIDAE (ACARINA).

By ROBERT DOMROW, Queensland Institute of Medical Research, Brisbane.

(Twenty Text-figures.)

[Read 27th November, 1957.]

Synopsis.

Six new species of Laelaptidae are described: *Bewsiella fledermaus*, n. g., n. sp., *Trichosurolaelaps striatus*, n. sp., *T. emanuelae*, n. sp., *Laelaps wasselli*, n. sp., *L. southcotti*, n. sp., and *L. habrus*, n. sp. The males of *Peramelaelaps bandicoota* and *Mesolaelaps antipodanus* are described for the first time. Keys are given to Australasian species of *Trichosurolaelaps*, *Mesolaelaps* and *Laelaps*.

The genus *Mesolaelaps* is revised, the number of included species being increased from three to six by transferring species formerly placed in *Heterolaelaps*, *Laelaps* and *Hypoaspis*.

New combinations: *M. antipodanus* (Hirst), *M. sminthopsis* (Womersley) and *M. bandicoota* (Womersley).

New synonymy: *Heterolaelaps* Hirst, 1926 = *Mesolaelaps* Hirst, 1926; *M. thalacomys* Womersley, 1956 = *M. lagotinus* Hirst, 1931; *Liponyssus echinus* Oudemans, 1925 = *Liponyssus magnistigmatus* Vitzthum, 1920 = *Leiognathus spinosus* Berlese, 1910, now placed in *Neolaelaps*.

This paper is concerned with the laelaptid mites examined at this Institute in recent years. Six new species and two previously unknown males are described, and some additional species and genera are discussed. New host records have been indicated by an asterisk.

This material includes the following two special collections. In June, 1956, during an investigation into reports of a "fever" (which appears to have been leptospirosis) at the Lockhart River Mission on Cape York Peninsula (13° S., 143° 30' E.), Dr. M. J. Mackerras made a small collection of parasitic mites containing three laelaptid species, one of which is new. In November and December of the same year Miss M. L. Emanuel carried out further leptospirosis investigations in Papua (8° to 10° S., 147° to 149° E.), and brought back the formalinized bodies of 46 rodents and three bandicoots, from which I made the second collection. This material yielded five species of Laelaptidae, of which two are new. In order to be sure of the host correlation, I have neglected any odd specimens found scattered among the loose outer fur of the animals, keeping only those found in numbers deep in the fur or attached. In this respect Lawrence's (1956) caution on the use of museum skins for the collection of parasitic mites is timely.

The rat and bat hosts from Cape York Peninsula were identified by Dr. W. A. McDougall and Mr. G. Mack respectively, while Mr. E. Le G. Troughton named the Papuan animals. I am most grateful to them, and to the donors of this interesting material, for their cooperation.

BEWSIELLA, n. g.

Diagnosis.—Liponyssinae with two subequal dorsal shields and strong dorsal peritremes. Legs I enlarged; coxae armed; femora I and II with strong setae dorsally. Sternal shield with three pairs of setae; extended posterolaterally to take in metasternal pores. Genitoventral shield tapering and irregular posteriorly, with about seven scattered setae in addition to usual two genital setae. Anal plate discrete. Genotype: *Bewsiella fledermaus*, n. sp.

The new genus is named after my former teacher, Mrs. A. E. Bews. It is distinguished from the other two liponyssine genera with divided dorsal scuta, as defined by da Fonseca (1948), by amending his key as follows.

3. Postdorsal and anterodorsal shields subequal and contiguous; sternal shield enlarged posterolaterally to accept metasternal pores; genitoventral shield with several setae in addition to genital pair; peritremes broad; legs I enlarged, with strong seta dorsally on femora; coxal setae strong *Bewsiella*, n. g.

- Dorsal shields not contiguous; metasternal pores free in cuticle; genitoventral shield with only two genital setae; peritremes slender; legs I slender, and without enlarged setae dorsally on femora; coxal setae slender 3a.
- 3a. Postdorsal shield minute, broadly separated from anterodorsal shield; sternal shield reduced with only two pairs of setae *Ophionyssus* Ménézin.
- Postdorsal shield larger, but still separated from anterodorsal shield; sternal shield with usual three pairs of setae *Steatonyssus* Kolenati.

BEWSIELLA FLEDERMAUS, n. sp. (Text-figs. 1, 2.)

Types: Holotype female and paratype female in Queensland Museum. Both on rump of the bat *Hipposideros cervinus* (Gould), Lockhart River Mission, 13.vi.1956.

Description of female.—A medium-sized, weakly sclerotized species, without medial idiosomal constriction. Length 444 μ , breadth 263 μ . Peritremes dorsal, very wide and distinct, reaching forward almost to vertex. *Dorsal shield* divided at level of stigmata into subequal anterior and posterior shields, both of which have pore-like openings and scaly markings. Anterior shield with twenty pairs of larger setae, and posterior shield with about sixteen pairs of smaller setae. *Venter*: Sternal shield with convex anterior margin and three pairs of setae; extended posterolaterally to take in metasternal pores in addition to two pairs of sternal pores. Metasternal setae on small platelets. Genital plate tapering and irregular posteriorly, with about seven setae in addition to two genital setae. Genital operculum distinctly and irregularly marked. Anal shield small, with anus near anterior margin, and adanal setae near level of posterior of anus. Postanal seta twice as strong as adanals. Metapodal plates exceedingly weak. Ventral cuticle with 30 to 36 pairs of setae. *Gnathosoma*: Sensory seta on palpal tarsus two-tined. Chelicerae not clearly visible, but very weakly sclerotized and apparently without teeth. *Legs*: Leg I much stouter than other legs, and with stronger claws. Leg setation weak apart from quite strong coxal spines and longer setae dorsally on femora I and II.

Male unknown.

Distribution.—Known only from the type host and locality on Cape York Peninsula.

NEOLAEALAPS Hirst.

NEOLAEALAPS SPINOSUS (Berlese, 1910).

This characteristic species, the only one in the genus, has an interesting history, which is best considered chronologically. Berlese (1910) described *Leiognathus spinosus* briefly from *Pteropus vampyrus edulis* Geoffroy in Java, giving measurements and stressing its spiniform setae, but *Leiognathus* is preoccupied in Pisces and equivalent to the later *Liponyssus* auct. Vitzthum (1920, 1926) described *Liponyssus magnistigmatus* in great detail from the same host and locality. Later in 1926, Hirst erected the genus *Neolaelaps*, with Vitzthum's species as genotype by monotypy, and recorded it from *Pteropus* in Sarawak and Ceylon. He also suggested that Berlese's species might be a synonym of Vitzthum's. In view of the agreement in the few concrete characters given by Berlese, and the coincidence of host and locality data, I accept this synonymy. A further synonym of Berlese's species is *Liponyssus echinus* Oudemans, 1925, which was described in detail from a bat from Ambon. One's first impression of this species is its spiny appearance.

I am now able to record it from Australia, as follows—a large series of both sexes from **Pteropus conspicillatus* Gould, Innisfail, N. Queensland, 20.viii.1956. Through the courtesy of Mr. H. Womersley I have also seen a small series from the same host, Cairns, June, 1946, H. Sutton coll.

ECHINONYSSUS Hirst.

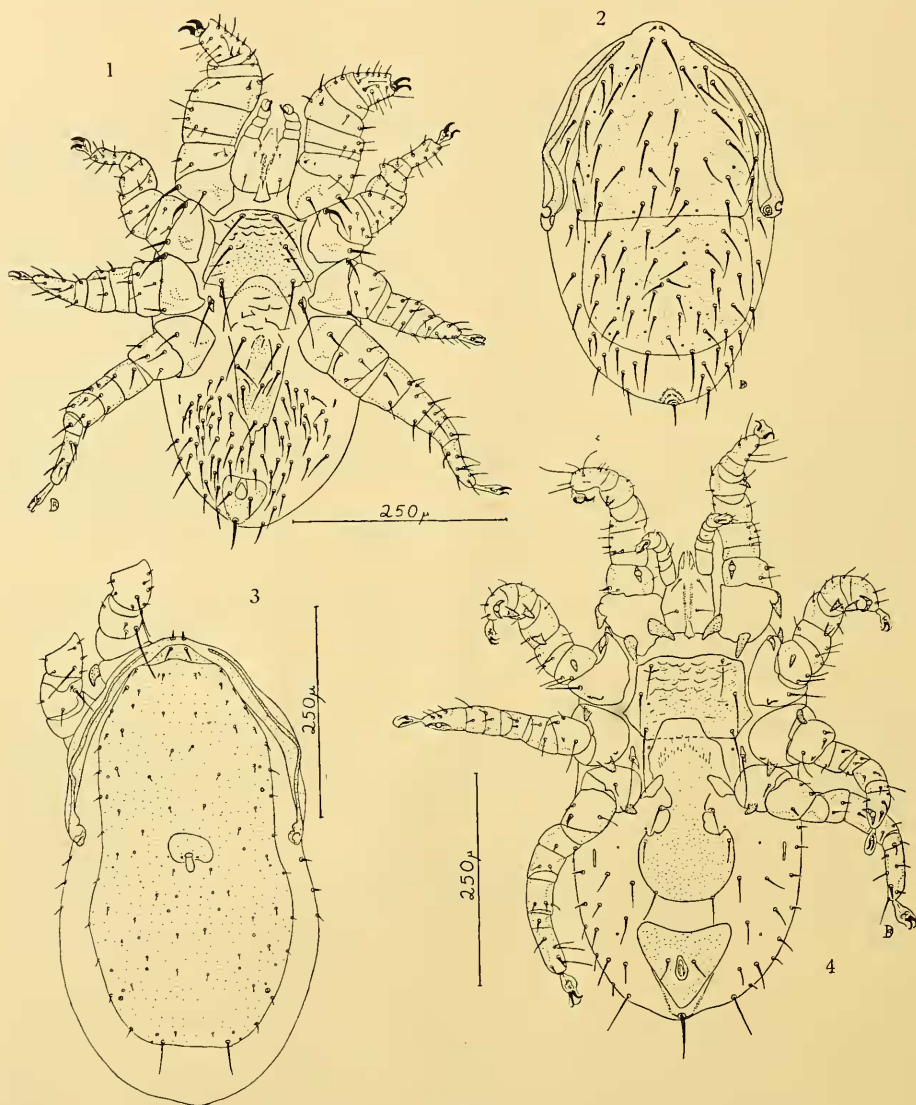
ECHINONYSSUS VALIDIPES Domrow, 1955.

Types: The holotype female and allotype male have been transferred from this Institute to the collection of the Queensland Museum.

This species was originally recorded from Queensland, but Mr. Womersley tells me that the South Australian Museum also has specimens from the type host, the rat-kangaroo, *Potorous tridactylus* (Kerr), labelled Tasmania, March, 1947.

TRICHOSUROLAELAPS Womersley.

Remarks.—The genus *Trichosuroaelaps* was erected by Womersley (1956) for a new species, *T. crassipes*, from the phalangerid *Trichosurus vulpecula* (Kerr). I have since collected additional specimens from the type host (D'Aguilar Range, 1 and 4.iv.1957), and with further experience in mounting mites can now say that the



Text-figs. 1-4.

- 1, 2.—*Bewsiella fledermaus*, n. g., n. sp. 1, Venter of female; 2, Dorsum of female.
3, 4.—*Trichosuroaelaps emanuelae*, n. sp. 3, Dorsum of female; 4, Venter of female.

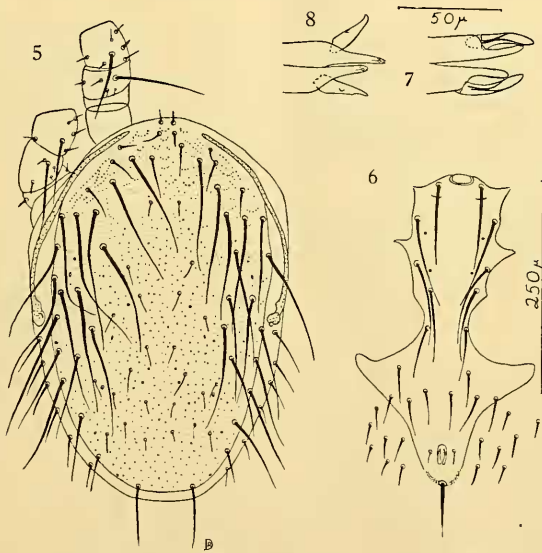
indentations shown on the posterior margin of the idiosoma in my illustration of the genotype (in Womersley, 1956, figs. 38, A and B) are artefacts due to excessive heating of the polyvinyl alcohol medium. The outline should be evenly rounded, as in the two new species described below. The clear band around the genital shield is the very weakly sclerotized margin of this shield, rather than non-striate cuticle. This is clearly shown in one specimen in which this shield is fractured. The relationships of the three species may be seen from the following key.

Key to species of *Trichosurolaelaps Womersley*.

- | | |
|---|--------------------------------|
| 1. Females | 2. |
| Males | 4. |
| 2. Tritosternal base with one posterior point; some segments of legs I-III with doubly bladed setae; from peramelid, Papua | <i>T. emanuelae</i> , n. sp. |
| Tritosternal base with two posterior points; legs without doubly bladed setae; from phalangerids, Australia and New Zealand | 3. |
| 3. Peritremes very narrow along most of length, but wide basally; anterolateral corners of sternal shield normal; genitoventral shield centrally flask-shaped, with margins hyaline; from <i>Trichosurus</i> | <i>T. crassipes</i> Womersley. |
| Peritremes normal and of uniform thickness; anterolateral corners of sternal shield emarginate to accept enlarged coxae I; genitoventral shield evenly sclerotized and oval in outline; from <i>Pseudochetrus</i> | <i>T. striatus</i> , n. sp. |
| 4. Dorsum with numerous very long setae laterally; peritremes of normal length; holovenral shield expanded behind coxae IV | <i>T. emanuelae</i> , n. sp. |
| Dorsum without very long lateral setae; holovenral shield tapering behind coxae IV .. | 5. |
| 5. Cuticle of dorsal shield smooth; peritremes of normal length; with four pairs of ventral setae | <i>T. crassipes</i> Womersley. |
| Cuticle of dorsal shield with distinct longitudinal striations; peritremes abbreviated; with three pairs of ventral setae | <i>T. striatus</i> , n. sp. |

TRICHOSUROLAELAPS EMANUELAE, n. sp. (Text-figs. 3-8.)

Types: Holotype female, one paratype female and two paratype males in Queensland Museum; two paratype females in British Museum (Natural History). All six specimens from the bandicoot *Echymipera kalabu kalabu* (Lesson), in forest behind Mission quarters, Gona, 6.xii.1956.



Text-figs. 5-8.—*Trichosurolaelaps emanuelae*, n. sp. 5, Dorsum of male; 6, Holovenral shield of male; 7, Chelicerae of male; 8, Chelicerae of female.

Description of female.—A medium-sized, heavily sclerotized species; idiosoma 526–537 μ long, 257–269 μ wide anteriorly, and 269–292 μ wide posteriorly; with faint medial constriction. *Dorsum*: Peritremes dorsolateral, extending almost to vertex, rather narrow except at extreme base. Dorsal shield slightly constricted medially, truncate posteriorly, and with 36 pairs of very small setae and one longer pair posteriorly; numerous small pores open onto dorsal shield. Beneath the centre of the shield is a structure which is possibly glandular in nature. *Venter*: Tritosternum with single small process on basal section. Sternal shield subrectangular, with anterior margin concave medially and posterior margin rectilinear; with scale-like markings on anterior half. Usual three pairs of sternal setae and two pairs of pores present. Metasternal pore isolated in cuticle, but metasternal setae set on small platelets.

Genitoventral shield axe-shaped, with genital setae on small lateral projections, and two pairs of ventral setae on the blade. Third pair of ventral setae free in cuticle near shield. Genital operculum longitudinally striate. Metapodal plates very weak. Anal plate triangular, with anterior margin concave. Anus central, flanked by adanal setae; postanal seta much stronger than adanals. Ventral cuticle longitudinally striate except for transverse band of striations between genitoventral and anal plates; with twelve to fourteen pairs of simple setae. *Gnathosoma*: Sensory seta on palpal tarsus two-tined. Chelicerae weakly sclerotized, with only a single weak tooth on the movable finger. *Legs*: All coxae heavily armed; tibiae I and tarsi, tibiae, genua and trochanters II with retrorse spurs; trochanters I and tarsi II and III with peculiar doubly spurred setae. Genua and femora I and II each with long seta dorsally. All tarsi with two claws and well-developed ambulacral apparatus.

Description of male.—Smaller than female, and without medial idiosomal constriction; length 456 μ , breadth 292 μ . Peritremes expanding forward almost to vertex. Dorsal shield with fifteen pairs of very long setae and about twenty pairs of shorter setae; with scale-like markings anterolaterally. *Venter*: Sternal, metasternal, genital, ventral and anal shields fused to form holoventral shield, which expands behind coxae IV and then tapers rapidly to the anal area. With usual six pairs of setae and three pairs of pores in addition to postanal seta and four pairs of ventral setae. Genital aperture on convex anterior sternal margin. *Gnathosoma*: Chelicerae with unarmed digits; spermatophore carrier larger than movable finger.

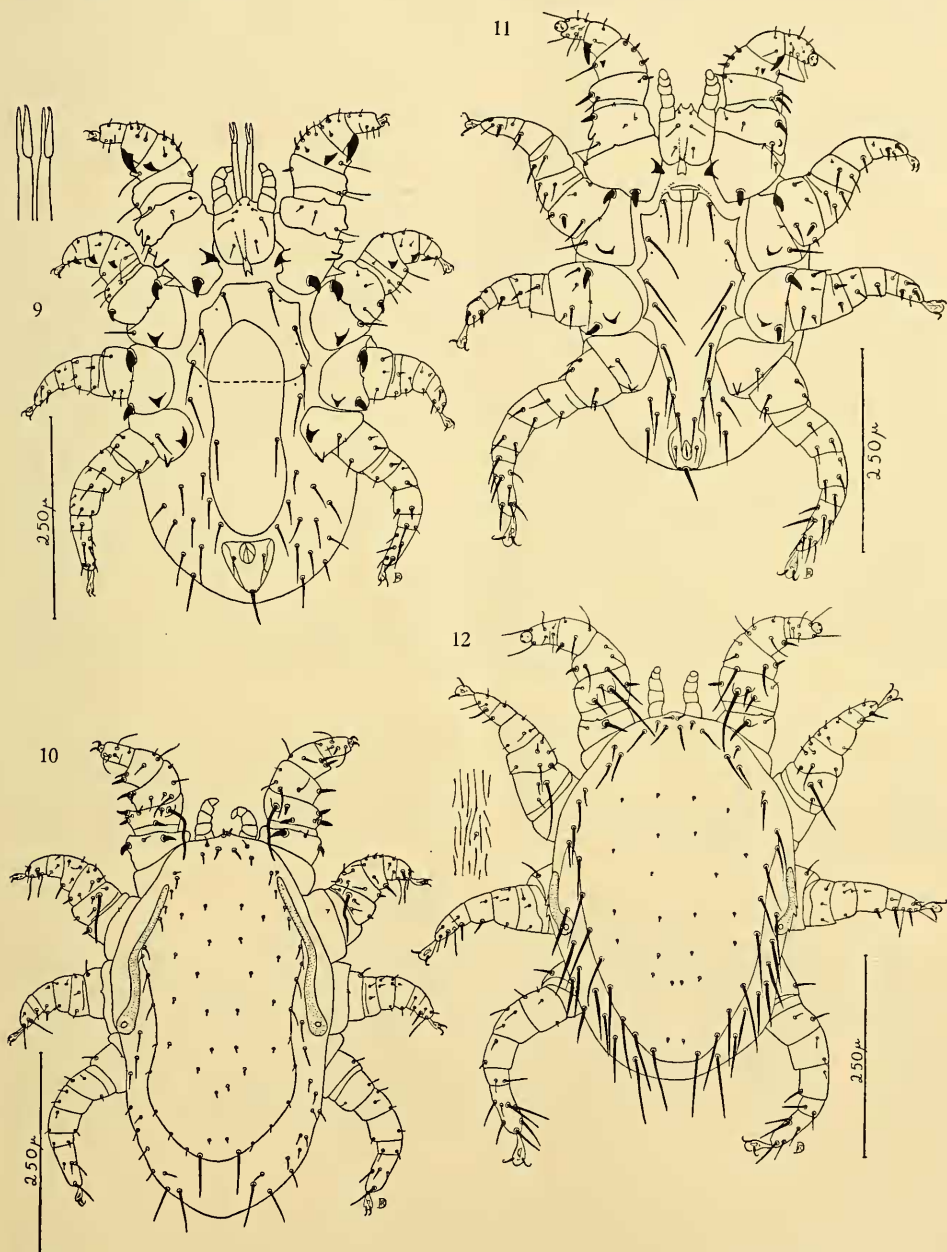
Distribution.—Known only from the type host in Papua.

TRICHOSUROLAELAPS STRIATUS, n. sp. (Text-figs. 9-12.)

Types: Holotype female and allotype male in Queensland Museum; paratypes of both sexes in United States National Museum and British Museum (Natural History). In all, nine females and eight males from the ring-tailed possum, *Pseudocheirus laniginosus* (Gould) (Phalangeridae), Mt. Nebo, S.E. Queensland, 29.x.1954, and Brisbane, 10.iv.1957.

Description of female.—A medium-sized, heavily sclerotized species; idiosoma 445–468 μ long, 260–288 μ wide, with only very slight constriction at level of stigmata. *Dorsum*: Peritremes dorsolateral, extending forward to level of coxae I; of uniform width; stigmata between coxae III and IV. Dorsal shield constricted medially, evenly rounded posteriorly; vertex with eight paired setae; lateral margins with fifteen pairs of setae, the posterior pair being by far the strongest; disc with 24 minute setae arranged 4.6.4.8.2. The texture of the dorsal shield is apparently smooth. Marginal cuticle with ten to fifteen pairs of setae which increase in length posteriorly. *Venter*: Tritosternal base with two minute and pointed processes posteriorly. Sternal shield with anterolateral corners emarginate to accept large coxae I; posterior margin almost rectilinear; with usual three pairs of setae and two pairs of pores. Metasternal setae and pores free in cuticle. Genitoventral shield a simple oval, with one pair of setae; operculum extending forward to between sternal setae I and II, and longitudinally striate. Anal shield weakly sclerotized, except laterally, and with anus at anterior margin. Adanal setae much weaker than postanal seta. Ventral cuticle with about ten pairs of setae, three of which flank the genitoventral shield. *Gnathosoma*: Chelicerae very slender, with digits unarmed except for small apical tooth on movable finger. *Legs*: Coxal setae arranged in usual 2.2.2.1 pattern, but much modified. Coxae I with anterior seta minute and set in extreme distal angle; posterior seta spine-like; with two additional spurs. Coxae II with anterior seta spine-like and posterior seta normal; with one additional spur. Coxae III with both anterior and posterior seta spine-like; with one additional spur. Coxae IV with normal seta and two additional spurs. Tibiae and genua I and tarsi, tibiae and genua II each with retrorse spur on posterior ventral margin. Central four segments of legs I with spurs on posterior dorsal edge. Femora I and II with much enlarged seta dorsally. Genua I with similar but rather smaller seta. Tarsi with usual ambulacra, that of I being reduced, though the claws are normal.

Description of male.—Somewhat smaller than female, idiosoma length 348–418 μ , breadth 208–288 μ ; without any medial constriction. *Dorsum*: Peritremes abbreviated, extending forward only to level of anterior margin of coxae III; with two or three



Text-figs. 9-12.—*Trichosuroaelaps striatus*, n. sp. 9, Venter of female, with inset of chelicerae at twice indicated scale; 10, Dorsum of female; 11, Venter of male; 12, Dorsum of male, with inset of striae on dorsal shield at twice scale indicated.

minute retrorse spines along outer edge of peritreme. Dorsal shield not constricted medially and evenly rounded posteriorly. Surface covered by short, delicate, longitudinal striae which do not form a network. Vertex with eight paired setae; marginal

setae in fifteen pairs, very much stronger than in female, and increasing in length posteriorly; disc of shield with 24 minute setae arranged 4.6.4.8.2, as in female. Marginal cuticle with eight or nine pairs of setae, the more anterior ones being slightly bladed. *Venter*: Holoventral shield of normal composition, with ventral area tapering narrowly behind coxae IV to expand posteriorly into anal area. Anterior sternal margin concave around genital aperture. Ventral area of shield and ventral cuticle both with six paired setae. *Legs* essentially as in female, but with armature slightly weaker on legs I and II, and somewhat stronger apically on III and IV. Ambulacrum of tarsi II-IV normal; that of I reduced and set in concave ends of tarsi; claws rudimentary.

Distribution.—Known only from the type host in S.E. Queensland.

PERAMELAELAPS Womersley.

PERAMELAELAPS BANDICOOTA Womersley, 1956. (Text-fig. 13.)

Description of male.—Rather weakly sclerotized and slightly smaller than female; idiosoma 394 μ long, 240 μ wide. *Dorsum* almost entirely covered by dorsal shield, with only exceedingly narrow band of marginal cuticle posteriorly. Setation generally as in female. *Venter*: Tritosternum with usual two fine laciniae; basal portion with minute hairlets laterally. Holoventral shield of typical construction, with genital aperture on convex anterior sternal margin. Ventral area moderately expanded behind coxae IV, and tapering unevenly to anal area; with three or four pairs of setae. Postanal seta twice as strong as adanal setae, which are set at level of anterior of anus. Entire surface of holoventral shield with exception of metasternal and anal areas with usual reticulatory markings. Metapodal shields elongate and well developed. Ventral cuticle with about ten pairs of simple setae. Stigmata placed ventrally between coxae III and IV; peritremes abbreviated, reaching along sides of idiosoma to level of posterior margins of coxae II. *Legs* of typical facies; without stronger setae on dorsum of genua and femora I and II. All tarsi with usual ambulacrum and two claws. Coxae II to IV with very weak sclerotized process in comparison with those of female.

Remarks.—This is the species referred to as a new genus and species by Domrow and Smith (1956, p. 203). It is very common on the type host *Thylacis obesulus* (Shaw and Nodder) in Brisbane suburbs. A further record from this host is one female, Mossman, 20.ii.1954. It has also been taken on **Perameles nasuta* Geoffroy as follows: several specimens of both sexes, Mt. Glorious, August, 1955, and one female, Goondi, N.Q., 14.iii.1957.

HAEMOLAEELAPS Berlese.

HAEMOLAEELAPS DOMROWI Womersley, 1958.

Three females and one female respectively from the bandicoots **Thylacis macrourus moresbyensis* (Ramsay), Sapphire Creek, Port Moresby area, 17.xi.1956, and **Peroryctes raffrayanus raffrayanus* (Milne Edwards), in kunai grass, Inonda, near Popondetta, 3.xii.1956. Several specimens of this species, together with two other species normally found on bandicoots (*Mesolaelaps anomalus* and *M. australiensis*, see below), were taken on two *Rattus rattus* (Linné), 28 and 29.ix.1955, Innisfail. These rats had doubtless been in recent contact with bandicoots, and the records are considered exceptional.

MESOLAEELAPS Hirst.

The genus *Mesolaelaps* Hirst, 1926, was erected for two new species, *M. anomalus* and *M. australiensis*, the former having page precedence and being described in detail. Radford (1950) says Hirst designated *anomalus* as genotype in the original article according to Article 30, rule *a*, but this is not so. His page reference is also incorrect; it should read 840, not 800. However, Vitzthum cited it as the genotype in 1942, and his action was valid.

In the same paper Hirst erected *Heterolaelaps* for one new species, *H. antipodianus*, which is thus the genotype by monotypy. I have examined material of all three species, and cannot concede that they are even subgenerically distinct. Although

Heterolaelaps has page precedence over *Mesolaelaps*, I take advantage of Article 28 to place *Heterolaelaps* as a synonym of *Mesolaelaps*, firstly because the species originally included in *Mesolaelaps* were more accurately described than the single species of *Heterolaelaps*, and secondly because the genotype of *Mesolaelaps* is commoner and more typical of the genus as here defined than that of *Heterolaelaps*.

Rediagnosis of Mesolaelaps Hirst, 1926.

Round, heavily sclerotized laelaptine species, about 1 mm. in length. Dorsal shield rather small, with very strong but sparse setation; with four rather long, anteriorly directed vertical setae; marginal cuticle very broad with very numerous, much weaker setae. Genitoventral shield reduced and tapering, typically with three pairs of setae; widely separated from large, elongate anal shield. Ventral cuticle also with exceedingly numerous short setae. Coxal armature variable, and correlated with modification of certain body setae. Legs slender, with strong outstanding setae on apical segments, especially II to IV. Chelicerae slender, with weak dentition and very short pilus dentarius. On various native mammals in Australia and New Guinea. Genotype: *M. anomalus* Hirst, 1926.

The genus comprises the three species named above, and three others, namely: *M. lagotisinus* Hirst, 1931 (= *M. thalacomys* Womersley, 1956), *Hypoaspis bandicoota* Womersley, 1956, and *Laelaps sminthopsis* Womersley, 1954.

Recent collections have provided good series of Hirst's three original species which agree with his and Womersley's (1955, 1956) subsequent redescriptions. Of Hirst's later species, *M. lagotisinus*, I have seen the holotype of its synonym, *M. thalacomys*, and of Womersley's two species, the type series and further material which agrees with the types. It has therefore been thought advisable to revise these six species, which may be divided into two groups, depending on the coxal armature, and are keyed on this basis below. Group I (the simple species) is mainly confined to eastern and northern Australia and Papua, while Group II (the modified species) occurs in S.E. Queensland and southern and western Australia.

Characters of Taxonomic Value.

Close examination of the six species has shown that the following six categories of characters are of taxonomic value.

1. *Hypostomal setae and tritosternum*.—The four pairs of hypostomal setae are usually slightly barbed in all species, but in *sminthopsis* the basal pair is much enlarged and heavily spined. The tritosternal base in *lagotisinus* is flanked on both sides by a row of spinose processes which extend laterally beyond the level of sternal setae I. These processes are not present in the other five species.

2. *The sternal complex*.—The sternal shield is typically subquadrate with the posterior margin concave. The shield is somewhat elongate, and with the posterior margin convex in *anomalus*, while in *antipodianus* it is transverse and almost rectilinear posteriorly. Sternal setae I are nude (or with one or two fine barbs) in *anomalus*, slightly barbed in *antipodianus*, *bandicoota* and *australiensis*, strongly barbed in *lagotisinus*, and heavily spined in *sminthopsis*. Sternal setae II are somewhat approximated in *antipodianus* and markedly so in *sminthopsis*.

3. *The genitoventral complex*.—The genitoventral shield is typically small and tapering, but is larger and somewhat expanded behind coxae IV in *bandicoota*. In four species the first pair of ventral setae are set wider apart than the genital setae. In *bandicoota*, due to the enlarged shield, the second pair of ventral setae are even wider apart, while in *lagotisinus*, which has the smallest shield, the genital setae are widest apart. In *bandicoota*, *antipodianus* and *sminthopsis* there are four pairs of setae rather than three around the genitoventral shield, but it is difficult to decide whether the more posterior setae are on or off the shield. The genital setae reach the end of the shield in all species except *bandicoota*, which has by far the largest shield. The length of these setae is variable in *australiensis*.

4. *The anal complex*.—The anal shield is exceedingly large in *anomalus*, and fairly large in *bandicoota* and *antipodianus*. The adanal setae in these three species

correspondingly do not reach the insertion of the postanal seta, as they do in the other three species with relatively smaller anal shields.

5. *Lateral body setae*.—In five species these setae (like the other body and leg setae in general) are slightly barbed. In *sminthopsis* they are thickened and almost serrate.

6. *Coxal armature*.—Three species have the coxal setae similar to the other leg setae and three have these setae modified. The anterior seta of coxae II and III is modified to a slender, tapering spur in *lagotisinus*, and in *antipodianus* to a stronger, blunt spur (absent, however, in the male). The maximum modification occurs in *sminthopsis*, in which the anterior seta of coxae II and III is spur-like and the posterior seta serrate. In addition, the anterior seta of coxa I is small and spur-like, while the posterior seta is modified to an extremely heavy retrorse spine.

Key to females of Mesolaelaps Hirst.

1. Coxal setae similar to other leg setae (Group I) 2.
Anterior seta of coxae II and III modified to a distinct spur (Group II) 4.
2. Genitoventral plate larger, expanded behind coxae IV *bandicoota* (Womersley).
Genitoventral plate smaller, tapering behind coxae IV 3.
3. Sternal shield convex posteriorly; anal shield large *anomalus* Hirst.
Sternal shield concave posteriorly; anal shield small *australiensis* Hirst.
4. Posterior seta of coxae I modified to very heavy spine; basal hypostomal setae enlarged and spined *sminthopsis* (Womersley).
Posterior seta of coxae I and basal hypostomal setae normal 5.
5. Anterior spur of coxae II and III tapering; tritosternum flanked by numerous spinose processes; sternal shield quadrate and concave posteriorly *lagotisinus* Hirst.
Anterior spur of coxae II and III thick and blunt; tritosternum not flanked by spinose processes; sternal shield transverse and rectilinear posteriorly *antipodianus* (Hirst).

GROUP I.

M. ANOMALUS Hirst, 1926 (genotype).

This species is apparently confined to the family Peramelidae. It was originally described from New Guinea, and the following additional records from Papua have been obtained: one female and two females respectively on the bandicoots **Peroryctes raffrayanus raffrayanus* (Milne Edwards), in kunai grass, Inonda, near Popondetta, 3.xii.1956, and **Echymipera kalabu kalabu* (Lesson), in forest behind Mission quarters, Gona, 6.xii.1956.

The species is also common on *Thylacis obesulus* (Shaw and Nodder) and *Perameles nasuta* Geoffroy in North Queensland.

M. AUSTRALIENSIS Hirst, 1926.

On bandicoots and "rats" and "mice" from Queensland to south-eastern South Australia. It overlaps the range of *M. anomalus* in North Queensland, and even occurs on the same individual bandicoot. It has also been recorded from mutton-birds' nests in Bass Strait by Womersley (1955), who described the male.

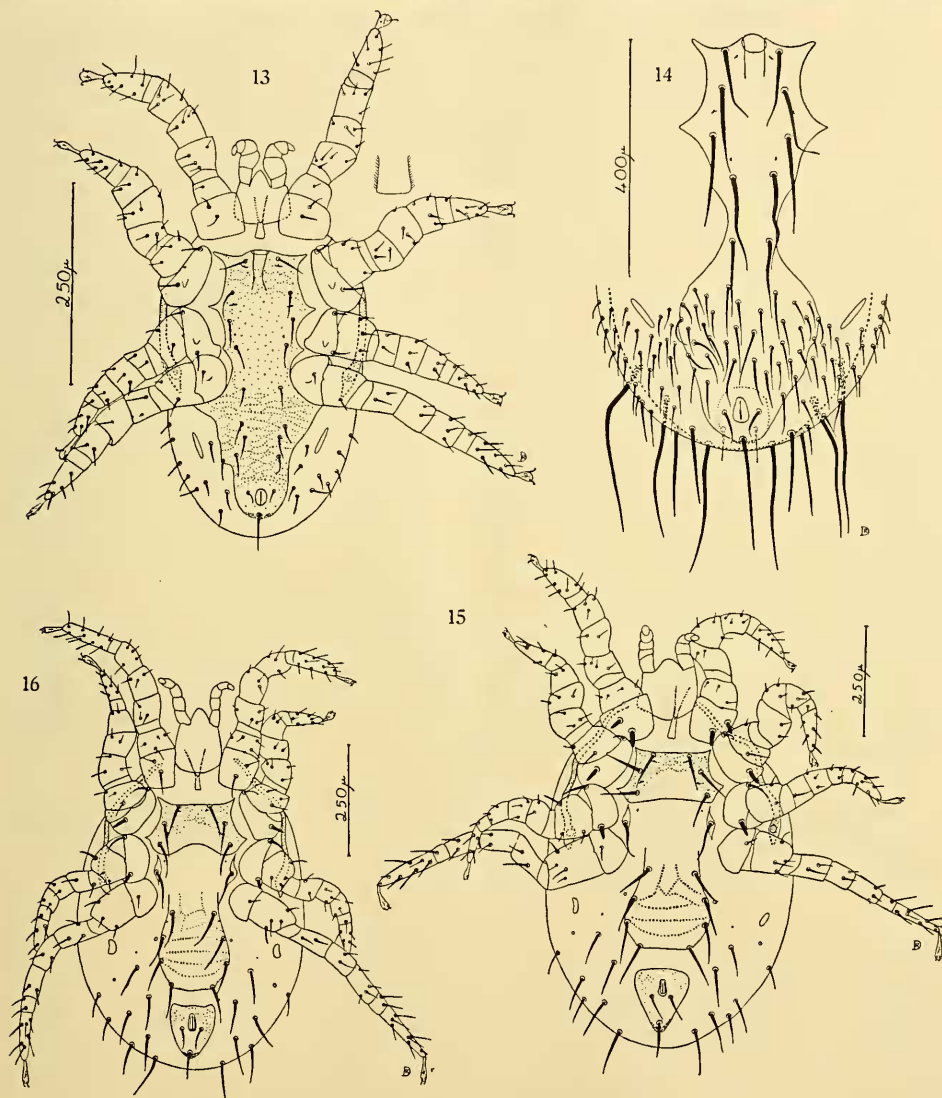
Through the courtesy of Mr. J. H. Calaby I have been able to examine ten specimens which I also place as this species. He says (*in litt.*, 8.iv.1957): "Host: **Myrmecobius fasciatus* Waterhouse [Myrmecobiidae], Dryandra (Narrogin District), S.W. Aust., 7.x.1955, 1 mite. Same locality, 18.ix.1956, 7 mites. In both cases the mites were taken from the short, rather sparse fur, close to the scrotum of the live male hosts. The mites were actively moving about among the fur. I examined a number of live specimens of the host of both sexes but these were the only mites seen. In both cases the number of mites collected appeared to be the total population on the host. Also a tube containing two mites from a small Dasyurid [marsupial mouse] collected by a colleague at Abydos. Station inland from Port Hedland in N.W. Australia (August to September, 1956). The mites were dead when I removed them from the frozen carcass of the animal several days after capture. The host [had] a fat tail . . . and may have been a *Dasymercus* or possibly an *Antechinus* of the *macdonnellensis* (Spencer) type."

I have also seen nine females from the echidna **Tachyglossus aculeatus acanthion* (Collett), 15 miles north of Innisfail, 26.viii.1955, which I refer to this species, although

they have relatively slender setae on the dorsal shield. These specimens were ascribed in error to *Haemolaelaps* Berlese in the 1956 Annual report of this Institute.

M. BANDICOOTA (Womersley, 1956), n. comb.

This species was originally described as a *Hypoaspis*, but fits naturally into *Mesolaelaps* as here defined. Doubt has been cast (Domrow and Smith, 1956) on the



Text-figs. 13-16.

13.—*Peramelaelaps bandicoota* Womersley. Venter of male, with inset of tritosternal base at about twice scale indicated. 14.—*Mesolaelaps antipodianus* (Hirst). Venter of male. 15.—*Laelaps wasselli*, n. sp. Venter of female. 16.—*Laelaps southcotti*, n. sp. Venter of female.

recorded host species, but later collections have proved that bandicoots are the true hosts (mainly *Thylacis obesulus* (Shaw and Nodder), but also **Perameles nasuta* Geoffroy, Mt. Glorious, 1.ix.1955). This species apparently prefers higher country, the type locality being Mt. Tamborine; subsequent series are from Mt. Glorious. Both these localities are in the extreme south-east of Queensland.

GROUP II.

M. LAGOTISINUS Hirst, 1931.

M. thalacomys Womersley, 1956, is a synonym of this species. Both were recorded from rabbit-bandicoot or bilby, *Macrotis* (= *Thalacomys*) *lagotis* (Reid) from south-western Australia.

M. ANTIPODIANUS (Hirst, 1926), n. comb. (Text-fig. 14.)

This species was originally placed in the genus *Heterolaelaps* Hirst, but has been reassigned for the reasons already stated. It occurs on bandicoots in South Queensland, New South Wales, Victoria and South Australia, and was redescribed by Womersley (1956). Through the courtesy of Mr. Womersley I have been able to examine a small series of both sexes from the bandicoot *Thylacis obesulus* (Shaw and Nodder) from Belair, S. Australia, 17.iv.1956, H.W. coll. He has also kindly allowed me to describe the male here for the first time.

The male is of the same general facies as that of *M. australiensis*, but somewhat larger and with stouter legs. Length of idiosoma 794μ , breadth 537μ . Length of holovenral shield from level of sternal setae I to postanal seta 642μ . Intercoxal portion of shield narrow with usual five pairs of setae, whose distances apart and lengths are (in micra) SI 89 and 111, SII 103 and 156, SIII 125 and 167, MS 67 and 158, G 58 and 125. Ventral area not greatly expanded behind coxae IV, about 233μ wide at this level. Ratio of length to breadth of holovenral shield 2.76. Ventral area with about 20 pairs of setae to 106μ discally and to 42μ marginally. Adanal setae 58μ , postanal seta 189μ long. Lateral body setae about 56μ long. Discal setae of dorsal shield from 140μ to 180μ long. Posterior arc of dorsal shield and terminal body cuticle with circlet of eleven setae (including postanal) which project strikingly beyond general body setation. The lengths of these five pairs of setae (from front to back) are 292μ , 242μ , 140μ , 120μ and 222μ . Surface of dorsal and holovenral shields with usual network of fine transverse striae. Anterior seta of coxae II and III like other leg setae, in striking contrast to thick, blunt spurs found in female.

Remarks.—The male of *antipodianus* may be separated from the other known male, *australiensis*, by its greater size, the circlet of eleven outstanding posterior setae, and the ratio of length to breadth of the holovenral shield. This ratio in *antipodianus* is 2.76, while in *australiensis* (which has this shield broadly expanded behind coxae IV) the ratio is only 1.65 (calculated from Womersley's illustration, 1955).

M. SMINTHOPSIS (Womersley, 1954), n. comb.

This species was originally described as a *Laelaps*, but is a member of *Mesolaelaps* as defined above. It is the most modified of all the species and is known only from marsupial mice from Victoria and S.E. Queensland.

LAELAPS Koch.

LAELAPS ROTHSCILDI Hirst, 1914.

This species is virtually host specific for the genus *Melomys* in Australia and New Guinea, and is exceedingly common on *M. littoralis* (Lönnberg) and *M. cervinipes* (Gould) in the Innisfail area. I have also seen 25 females from **M. australis* Thomas, Lockhart River Mission, June, 1956; two females from **Rattus rattus* (Linné), South Johnstone, 5.x.1956; four females from the muzzle of "a large grey mouse (head and body about 4")" in rain forest, 3000', Springbrook, 19.iv.1947, E. N. Marks coll. The male is unknown.

LAELAPS ECHIDNINUS Berlese, 1887.

Twenty-five females of this species have been collected on four occasions on **R. assimilis* (Gould), Etty Bay, North Queensland, November, 1955, and April, 1956.

LAELAPS HAPALOTI Hirst, 1931.

The original spelling of the specific name "*hapoloti*" is in error, being based on the rodent genus *Hapalotis*. Womersley's (1937, 1956) records are all from native rodent genera, but I have seen five females from a "marsupial mouse", Soudan, 300 m. N.E. of Alice Springs, July, 1954, A. L. Rose coll.

LAELAPS ASSIMILIS Womersley, 1956.

Since the original records this species has proved to be very plentiful on the type host, *Rattus assimilis* (Gould) in S.E. Queensland. Numerous specimens of both sexes have also been taken on *R. culmorum* Thomas and Dollman from Kim Kim, 6.ix.1957. The coxal setation is similar to that of *L. nuttalli* (see Hirst, 1915). The genitoventral shield is wider than long; length from insertion of genital setae to posterior margin 148–162 μ , breadth 185–195 μ ; width between fourth pair of genital setae 102–111 μ . One abnormal female has been seen from Mt. Glorious, 10.xi.1955. On one side of the genitoventral shield the three additional ventral setae are lacking, while on the other side only the posterior one is present. The pair of genital setae are present.

LAELAPS NUTTALLI Hirst, 1915.

The following specimens have been seen: five females from **Melomys australis* Thomas, Lockhart River Mission, June, 1956, several females from 27 **Rattus villosissimus* (Waite), Richmond, N.W. Queensland, August, 1956, J. H. Pope and J. G. Carley coll., and seven females each from *R. rattus* (Linnaeus), Port Moresby, 31.x.1956, and **R. gestroi gestroi* (Thomas), Iduabada Village, Port Moresby, 12.xi.1956. Ferris (1932) has reported this species from the Pacific area under its synonym, *L. hawaiiensis* Ewing.

LAELAPS WASSELLI, n. sp. (Text-fig. 15.)

Types: Holotype female in Queensland Museum; one paratype female in British Museum (Natural History). Both from the water-rat, *Hydromys chrysogaster reginae* Thomas and Dollmann, Innisfail, 6.ix.1956. A second paratype female is in this Institute, from a "white-tailed water-rat", Farm Ck., Cape York Pen., 8.xi.1955, J. L. Wassell coll.

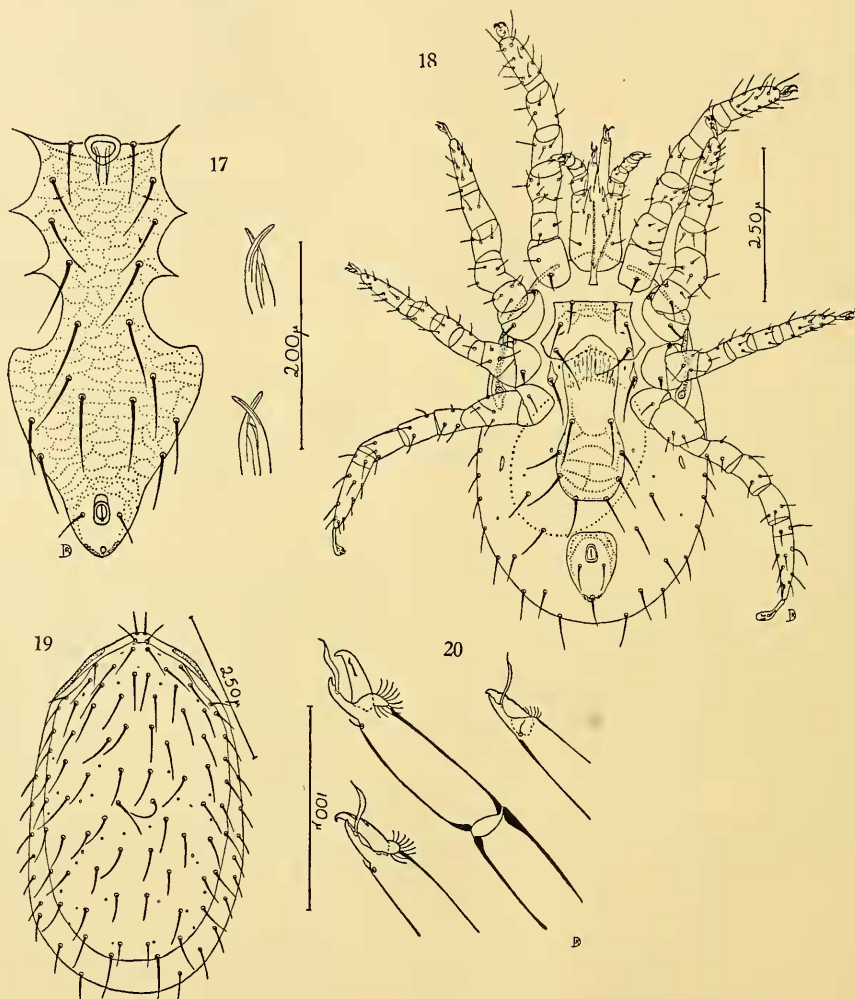
Description of female.—A rounded, medium-sized and well-sclerotized species; idiosomal length 788–835 μ , width 510–556 μ . Dorsum with single dorsal shield, whose setation is uniform and strong, except for vertical setae and the pair between the two long terminal setae; length of discal setae 72 μ ; length of two posterior pairs 97 μ and 38 μ . Marginal cuticle with ten to twelve pairs of similar setae. *Venter*: Sternal shield rather wider than long, with anterior margin rectilinear and posterior margin shallowly concave; with usual reticulatory markings anteriorly and laterally. Sternal and metasternal setae strong, with latter set on distinct platelets. Metasternal pores free in cuticle. Genitoventral shield expanded behind coxae IV as in *L. nuttalli*, but rather straight posteriorly; with usual four pairs of strong setae and few transverse linear markings; length 185–190 μ , breadth 185–190 μ ; width between fourth pair of setae 106–111 μ . Anal shield triangular, with sides longer than anterior margin. Anus set in broad anterior half of shield. Adanal setae set slightly behind level of posterior of anal pore, and barely reaching insertion of the stronger postanal seta. Metapodal shields small and narrow, elongate oval. Marginal cuticle with about six pairs of strong setae. Stigmata between coxae III and IV, while peritremes extend forward onto dorsum almost to vertex. *Gnathosoma*: Chelicerae very similar to those described below for *L. habrus*, n. sp. Legs: Coxae with usual 2.2.2.1 setal pattern. Both setae of coxae I modified to blunt spines, the posterior being slightly the larger. Coxae II with anterior seta normal and posterior seta spine-like. Coxae III as II, but with anterior seta stronger and posterior spine weaker. Coxae IV with normal seta. Genua and particularly femora I and II with at least one seta dorsally, which is much stronger than the other leg setae.

Distribution.—Known only from the type host and locality in North Queensland.

Remarks.—Womersley (1937) has recorded the European *Laelaps muris* (Ljungh) from *Hydromys chrysogaster* in South Australia. The slide had been given to the South Australian Museum by Professor T. H. Johnston, who had also presented a portion of the collection of Stanley Hirst, an English worker who had been in Adelaide several years before. It seems likely that this slide was part of that collection, and that the common host of *L. muris*, the European water rat or water vole, *Arvicola amphibius* (Linné), has been mistranslated into the Australian water rat, *Hydromys chrysogaster* Geoffroy.

LAELAPS SOUTHCOTTI, n. sp. (Text-figs. 16, 17.)

Types: Holotype female and one paratype female in the Queensland Museum; allotype male, four paratype males and seventeen paratype females in Queensland Institute of Medical Research. All specimens from *Uromys caudimaculatus* (Kreffit), Etty Bay, Innisfail area, 20.iii.1956.



Text-figs. 17-20.

17.—*Laelaps southcotti*, n. sp. Holoventral shield of male, with inset of chelicerae at same scale. 18-20.—*Laelaps habrus*, n. sp. 18, Venter of female; 19, Dorsum of female; 20, Dorsal, lateral and dorsolateral views of female chelicerae (from right to left).

Description of female.—A medium-sized, well-sclerotized species; idiosoma 672-696 μ long, 459-464 μ wide. *Dorsum* almost entirely covered by dorsal shield, with fairly strong setae to 63 μ long discally; posterior two pairs 92 μ and 40 μ long. *Venter*: Sternal shield with anterior margin straight and posterior margin rather deeply concave. Metasternal setae set on small platelets, but metasternal pores free in cuticle. Genito-ventral plate with four pairs of subequal setae; slightly expanded behind coxae IV; 172-180 μ long, 153-162 μ wide; width between fourth pair of setae 97-106 μ . Anal plate triangular, longer than wide, with anus and anal setae placed as in *L. habrus*. Metapodal plate small and bluntly oval. Marginal cuticle with about eight pairs of simple setae. *Gnathosoma*: Chelicerae very similar to those of *L. habrus* below.

Legs: Genua and femora I and II with some slightly stronger setae dorsally; but not nearly as strong as in other species. Coxal formula 2.2.2.1, as follows. Coxae I with both anterior and posterior seta slender and normal, with the latter the stronger; coxae II and III with anterior seta normal, and posterior seta enlarged and spine-like, their relative proportions being as in *L. wasselli* above; coxae IV with normal seta.

Description of male.—The male is somewhat smaller than the female (length of idiosoma 498 μ , breadth 290 μ), and is identical in all characters which are not determined by sex. Holovenral shield of usual construction, with surface reticulated as far back as the anus, and with a few fine lines flanking anus laterally. Sternal area rather broad, with usual five pairs of setae and three pairs of pores between anterior margin and coxae IV. Ventral area expanded behind coxae IV and slightly constricted before level of anus, with eight to ten setae. Adanal setae finer, placed opposite posterior half of anus. Postanal seta missing in both specimens, but socket larger than those of adanal setae. Genital aperture oval and projecting forward from the straight sternal margin. Chelicerae quite delicate, with fixed finger very weak and spermatophore carrier longer, and rather slender.

Distribution.—Known from the type host and locality in North Queensland.

LAELAPS HABRUS, n. sp. (ἀβρος, graceful, delicate). (Text-figs. 18–20.)

Types: Holotype female and four paratype females in Queensland Museum; four paratype females in Queensland Institute of Medical Research. All from the bandicoot *Echymipera kalabu kalabu* (Lesson) in forest behind Mission quarters, Gona., 6.xii.1956.

Description of female.—A medium-sized, elongate, and well-sclerotized species. Length of idiosoma 596–619 μ , breadth 339–374 μ . Peritremes arising ventrally between coxae III and IV and passing onto dorsum at level of coxae II to reach forward almost to vertex. Dorsal shield single, elongate oval, with numerous pores and 39 pairs of setae, of which the most posterior pair are ever so slightly barbed. Dorsolateral marginal cuticle with row of nine setae. *Venter:* Sternal shield with anterior margin almost straight and posterior margin distinctly concave medially; with usual six setae and four pores. Metasternal pores free in cuticle; metasternal setae set on well-sclerotized platelets. Genitoventral plate small, but expanded slightly behind coxae IV, with four pairs of setae, and linear markings as illustrated. Length of genital plate 134–144 μ , breadth 111–116 μ . Distance between fourth pair of genitoventral setae 51–65 μ . Genital operculum with three shallow lobes on anterior edge. Metapodal plates fairly well developed. Anal shield elongate, with anterior margin straight, and sides gently curved. Anus set in anterior half, with adanal setae somewhat longer than anus, and set at level of posterior of anus. Postanal seta subequal to adanals. Ventral cuticle with eleven pairs of setae, the two posterior setae being a continuation of the dorsolateral rows. *Gnathosoma:* Sensory seta on palpal tarsus two-tined. Shaft of chelicerae two-segmented, with small seta dorsally near the base of fixed finger. Movable finger with single apical tooth and two lateral teeth; fixed finger with flattened hyaline pilus dentarius, which projects outwardly between the lateral teeth of the movable finger. *Legs* slender, not heavily armed, with only slightly stronger setae dorsally on genua and femora I and II. Coxae I with anterior seta weak and posterior slightly stronger, neither being spine-like; coxae II with slender, curved anterior seta and weak posterior spine; coxae III similar to II, but posterior spine slightly stronger; coxae IV with ordinary seta.

Distribution.—Known only from the type host from Papua.

Remarks.—As no key to the Australasian species of *Laelaps* is available, the following is offered. It will also serve to summarize the diagnostic features of the three new species described above. The lengths given for the genitoventral shield are from the insertion of the genital setae to the posterior margin.

Key to females of Australasian species of Laelaps.

1. Genitoventral plate grossly expanded behind coxae IV 2.
- Genitoventral plate only slightly expanded behind coxae IV 3.
2. Anal plate longer than wide; setae on dorsal shield strong. Cosmopolitan on *Rattus* *echidninus* Berlese.

- Anal plate wider than long; setae on dorsal shield very weak. On *Melomys* in Queensland and New Guinea *rothschildi* Hirst.
3. Large, dark species, more than 1.2 mm. in length; sternal shield strongly convex anteriorly. On native rodents and marsupial mice in South and Central Australia .. *hapaloti* Hirst.
- Small, brown species, less than 0.9 mm. in length; sternal shield not markedly convex anteriorly 4.
4. Posterior two pairs of genitoventral setae much stronger than anterior two pairs; dorsal setation very weak. On *Pseudomys* in South Australia *finlaysoni* Womersley.
- All four pairs of genitoventral setae subequal; dorsal setation strong 5.
5. Anterior seta on coxae I slender and normal; dorsal seta on genua and femora I and II weak 6.
- Anterior seta on coxae I enlarged and spur-like; dorsal setae on genua and femora I and II strong 7.
6. Posterior seta on coxae II and III little modified; genitoventral plate small, 134-144 μ long, 111-116 μ wide; fourth pair of genitoventral setae 51-65 μ apart. On *Echymipera* in Papua *L. habrus*, n. sp.
- Posterior seta on coxae II and III greatly enlarged and spur-like; genitoventral plate large, 172-180 μ long, 153-162 μ wide; fourth pair of genitoventral setae 97-106 μ apart. On *Uromys* in Cape York Peninsula *L. southcotti*, n. sp.
7. Genitoventral plate distinctly wider than long; adanal setae not reaching insertion of postanal seta. On *Rattus assimilis* in Queensland *L. assimilis* Womersley.
- Genitoventral plate not wider than long; adanal setae reaching insertion of postanal seta 8.
8. Only anterior seta of coxae I enlarged and spur-like; genitoventral plate rounded posteriorly. Cosmopolitan on *Rattus* *L. nuttalli* Hirst.
- Both anterior and posterior seta of coxae I enlarged and spur-like; genitoventral plate flatter posteriorly. On *Hydromys* in North Queensland *L. wasselli*, n. sp.

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